



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/690,199

10/21/2003

Igor Astsaturov

API-02-13-US

3672

7590
Patrick J. Halloran
Aventis Pasteur
Knerr Building
Discovery Drive
Swiftwater, PA 18370

10/28/2008

EXAMINER

SHEN, WU CHENG WINSTON

ART UNIT

PAPER NUMBER

1632

MAIL DATE

DELIVERY MODE

10/28/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/690,199	Applicant(s) ASTSATUROV ET AL.	
	Examiner WU-CHENG Winston SHEN	Art Unit 1632	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4-7,11-15 and 17-28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4-7,11-15 and 17-28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim amendments filed on 07/03/2008 have been received and entered. Claims 2-3, 8-10, and 16 are cancelled. Claims 1, 11, 12, 14, 15, and 17-22 have been amended. Claims 23-28 are newly added. Claims 1, 4-7, 11-15, 17-28 are pending and currently under examination.

This application 10/690,199 filed on Oct. 21, 2003 claims benefit of provisional application 60/420,425 filed on Oct. 22, 2002. The publication number of this application 10/690,199 is US 2004/0223949 A1, published on Nov. 11, 2004.

Specification

In the reply filed on 07/03/2008, Applicant has amended the specification has been amended to insert a sequence listing. Applicant declares that the content of the paper and computer readable copies of the Sequence Listing are identical in content. Applicant indicates that the sequence listing contains no new matter as all of the sequences contained in the sequence listing are found in the application as originally filed (e.g., paragraph [0085]).

Applicant has also amended the specification to incorporate the language of originally filed claims 18-21 into the Detailed Description (paragraph [0045]). Applicant indicates that the amendment does not constitute new matter as the subject matter was originally filed in original claims 18-21. Applicants believe this amendment is proper and request the entry of these amendments.

The Examiner notes that paragraph [0085] of the specification originally filed (US 2004/0223949, publication date, 11/11/2004) discloses “--- two dominant epitopes from the melanoma antigen, gp100, modified to increase binding to class I MHC, gp100:209-2M

Art Unit: 1632

(IMDQVPFSV) and gp100:280-9V (YLEPGPVTV; Parkhurst, M. R., et al. 1996. J.Immunol. 157, 2539-2548) and the HIV p17 Gag protein derived peptide (SLYNTVATL; Parker, K. C., et al. 1992. J.Immunol. 149, 3580-3587)". Newly added claims 24-26 filed on 07/03/2008 recite "amino sequence IMDQVPFSV (SEQ ID NO: 2)" and "amino sequence YLEPGPVTV (SEQ ID NO: 3)". Therefore, the amendments to the specification by addition of Sequence Listing are proper and have been entered, and newly added claims 24-26 do not contain new matter. The Examiner also acknowledges that incorporating the language of originally filed claims 18-21 into the Detailed Description (paragraph [0045]) of specification is proper and have been entered.

Claim Objection

1. Claims 11-14 and 23 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 1 recites "melanoma-associated tumor antigen". Claims 11-14 and 23 depend from claim 1. Claims 11-14 and 23 recite "the tumor antigen", which is not further limiting "melanoma-associated tumor antigen" recited in claim 1. Further, it is noted that a NY-ESO-1 antigen, a MAGE antigen, a BAGE antigen, a GAGE antigen, and a RAGE antigen recited in amended claim 11 and 12 are not melanoma-associated tumor antigen, which has been discussed on page 10 of the office action mailed on 01/07/2008, as well as in the maintained scope of enablement in this office action documented below (See the teachings by Flad et al., 1998).

Claim Rejection – 35 USC § 112

Art Unit: 1632

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Previous rejection of claims 8-10 and 14-17 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, is ***withdrawn*** because the claims have been amended.

Claims 8-10 and 16 have been cancelled. Claim 14 no longer recites “the cytokine is a T cell activating cytokine”. Claims 15 and 17 no longer recite “the T cell activating cytokine”.

3. Claims 18-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. *This rejection is necessitated by claim amendments by Applicant filed on 07/03/2008.*

.Claims 18-24 recites the limitation "INF α 2b" in “wherein INF α 2b is administered at least ---”. There is insufficient antecedent basis for this limitation in the claim because claims 18-24 depend from claim 1 and claim 1 recites interferon alpha (i.e. INF α).

Claims 18-24 are also unclear because claims 18-24 recite “wherein INF α 2b is administered *at least* 10 MU/m²/day ---”. It is noted that claim 1 recites “administering 10MU/m²/day”, a narrower limitation than “*at least* 10 MU/m²/day” recited in claim 18-24. Therefore, the metes and bounds of the limitations recited in claim 18-24 are unclear.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Previous new matter rejection of claims 1, 4-7, 11-15, 17-22 under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention, is **withdrawn** because the claims have been amended.

Amended claim 1 filed on 07/03/2008 no longer recites the limitation “a therapeutically effective amount of interferon”. Claims 4-7, 11-15, 17-22 depend from claim 1.

5. Claims 1, 4-7, 11-15, and 17-22 **remain** rejected and newly added claims 23-28 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for treating melanoma in a host by administration to a host a polynucleotide encoding a melanoma-associated antigen, which comprises antigenic determinants that induce immune response, followed by multiple administration of interferon- α 2b at 20 MU/m²/day, 5 days/week for 4 weeks, wherein said administering of the polynucleotide and subsequent administration of interferon- α 2b result in an increased T cell response in the host relative to the T cell response that occurs following administering of the polynucleotide alone, **does not** reasonably provide enablement for treating melanoma by administration of 1) any tumor antigen other than

Art Unit: 1632

melanoma-associated antigen, or 2) subsequent administration of any interferon other than interferon- α 2b, or 3) administration of interferon- α 2b at any dose for any regimen. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to perform the invention commensurate in scope with these claims.

Applicant's arguments filed on 07/03/2008 have been fully considered and found not persuasive.

The rejection is ***maintained*** for the reasons of record advanced on pages 4-9 of the Non-Final office action mailed on 07/25/06, and elaborated on pages 3-8 of the Final office action mailed on 05/01/2007, and on pages 7-14 of the Non-Final office action mailed on 01/07/2008.

Applicant's arguments

Regarding the non-enablement embodiment for treating melanoma by administration of any tumor antigen other than a melanoma-associated antigen, Applicant argues that claim 1, part (a) has been amended to define the tumor antigen as a melanoma-associated tumor antigen. Applicant asserts that dependent claims 11 and 12 have been amended to list only melanoma-associated tumor antigens. Applicant indicates that new claims 23-26 are related to the melanoma-associated tumor antigen gp100. Accordingly, Applicant argues that the first aspect of the rejection is moot.

Regarding non-enabled embodiments directing to subsequent administration of any interferon other than interferon- α 2b, Applicant indicates that the phrase "a therapeutically effective amount of interferon" recited in claim 1 has been deleted and amended to recite "10MU/m²/day interferon alpha". Therefore, Applicant argues that the claims do not encompass any type of interferon, but only a very limited subset thereof.

Regarding non-enabled embodiments directing to administration of interferon- α 2b at any dose for any regimen, Applicant argues that the enablement requirement is satisfied if, given what those of skill in the art already know, the specification teaches enough that they can make and use the invention without "undue experimentation." Genentech v. Novo Nordisk, A/S, 108 F.3d 1361, 1365, 42 USPQ2d 1001, 1004 (Fed.Cir.1997); In re Vaeck, 947 F.2d established that "a patentee need not test all the embodiments of his invention" so long as "he provide[s] a disclosure sufficient to enable one skilled in the art to carry out the invention commensurate with the scope of his claims." Amgen v. Chugai and Genetics Institute, 927 F.2d 1200, 1213 (Fed. Cir. 1991). Applicant argues that the claims are not so broad, and the results are not so unpredictable, and the examples are not so limited. Applicant asserts that that there is an adequate basis of support for the amended claims. In re Soll, 97 F.2d 623,624, 38 USPQ 189, 191 (CCPA 1938).

Applicant argues that the specification describes at, for example, Examples 1 and 2 (see, in particular, paragraph [0083]), that therapeutically effective amounts of IFN- α 2b were found to range from 20 to six megaunits (MU) (the dosing being adjusted downward from an initial 20 MU depending upon the toxicity observed in each patient). Applicant argues that a key attribute of the claimed method is that the initial administration of a high dose of IFN- α 2b stimulates the patient's immune response against the melanoma-associated tumor antigen to which that patient was previously immunized. Applicant argues that it is reasonable to expect the skilled artisan to be able to select an appropriate dose from within the claimed range, and an undue burden would not be placed on the skilled artisan to select an initial dose of IFN- α of between, for example, approximately 10 and the currently accepted highest dose allowed by the FDA (e.g., 20 MU for IFN- α 2b as noted by the Examiner. Applicant asserts that the range of the initial dose is neither

Art Unit: 1632

unlimited nor outside of reason, and the skilled artisan would not be unduly burdened in selecting a particular type of IFN the instant specification. Applicant asserts that there are only a limited number of IFN- α species that may be selected; choosing from among these would not subject the skilled artisan to an undue amount of experimentation. Accordingly, Applicant asserts that the claims are enabled to the extent required under the law, see the above-described legal precedents of Genentech, Vaeck, Amgen, and Soll.

Response to Applicant's arguments

Regarding non-enablement embodiment for treating melanoma by administration of any tumor antigen other than a melanoma-associated antigen, the Examiner acknowledges that claim 1 has been amended to recite "melanoma-associated tumor antigen". However, as indicated in the new rejection of claims 11-14 and 23 under 35 U.S.C. 112, second paragraph, claims 11-14 and 23 continue to recite the limitation "the tumor antigen". Furthermore, it is worth noting that not all of the species of tumor antigens recited in amended claim 11 and 12 are melanoma-associated tumor antigen, which has been discussed on page 10 of the office action mailed on 01/07/2008. In this regard, it has been disclosed by **Vujanovic et al.** that a NY-ESO-1 antigen, a MAGE antigen, a BAGE antigen, and a GAGE antigen are tumor specific antigens associated with testis cancer (See page 10 of the office action mailed on 01/07/2008). Furthermore, as disclosed by **Flad et al.** (Flad et al., Direct identification of major histocompatibility complex class I-bound tumor-associated peptide antigens of a renal carcinoma cell line by a novel mass spectrometric method, *Cancer Res.* 58(24):5803-11., 1998), a RAGE antigen is associated with renal carcinoma, not associated with melanoma as Applicant asserted. Therefore, the aspect of

Art Unit: 1632

the rejection pertaining to non-enablement embodiment for treating melanoma by administration of any tumor antigen other than a melanoma-associated antigen, is *withdrawn* for claim 1, 4-7, 17-22, but *maintained* for claims 11-14, and claims 15 (which depends from claim 14).

Applicant's arguments filed on 07/03/2008 regarding non-enabled embodiments directing to 1) subsequent administration of any interferon other than interferon- α 2b, or 2) administration of interferon- α 2b at any dose for any regimen, have been fully considered and found not persuasive. The essence of Applicant's arguments filed on 07/03/2008 pertaining to these two aspects of the rejection remains the same as Applicant's arguments filed on 10/31/2008. In this regard, the following response has been documented on pages 12-13 of the office action mailed on 01/07/2008.

It is noted that the specification disclosed the following in one embodiment, IFN- α 2b (Schering Canada, Pointe-Claire, Quebec) may be administered using the dosages set forth by Kirkwood, et al. (*J.Clin.Oncol.* 14: 7-17, 1996; 20 MU/m²/d IV days/week.times.4 weeks), and dosages may be discontinued and restarted as necessary (See paragraph [0072], US 2004/0223949, the publication of instant application). Consistently, Applicant's own publication disclosed the same regimen (See abstract, **Astsatur** et al., Amplification of virus-induced anti-melanoma T-cell reactivity by high-dose interferon-alpha2b: implications for cancer vaccines. *Clin Cancer Res.* 9(12):4347-55, 2003). However, in the art at the time of filing, the administration of IFN- α 2b for treatment of melanoma was and has been unpredictable. For instance, **Sabel et al.** stated the following: *Early trials using low-dose and intermediate-dose regimens* (which reads on dose regimens lower than 20 MU/m²/day in the initial treatment, see the following sentences) *demonstrated no benefits to survival*. However, the Eastern

Art Unit: 1632

Cooperative Oncology Group trial EST 1684, showed that a high-dose regimen involving an induction phase of intravenous interferon-alpha-2b 20 MU/m² 5 days a week for 4 weeks, followed by a maintenance phase of subcutaneous 10 MU/m² 3 days a week for the remainder of a year, led to significant improvements in both disease-free and overall survival compared with observation. On the basis of these results, the US FDA approved high-dose interferon-alpha-2b for the post-surgical adjuvant therapy of high-risk melanoma. *Unfortunately, the results of subsequent trials involving high-dose interferon-alpha-2b have not been as clear and its role in the adjuvant treatment of melanoma remains controversial. Concerns remain regarding the design and interpretation of the clinical trials, the cost and toxicity of treatment, and the appropriate selection of patients who should be treated* (See, Sabel et al., abstract, Is there a role for adjuvant high-dose interferon- α 2b in the management of melanoma? *Drugs*, 63(11):1053-8, 2003). In light of the unpredictabilities regarding the interferon- α 2b dose regimen for treating melanoma, only the dose regimen disclosed in the specification of instant application is considered enabled.

In addition to the reasons reiterated in the preceding paragraphs, the Examiner emphasizes that the Examples 1 and 2 disclosed in the specification (in particular, paragraph [0083] which Applicant's arguments on), clearly documents the following disclosures:

Treatment with HDI: IFN α 2b (Schering Canada, Pointe-Claire, Quebec) was administered using the dose and schedule previously tested (Kirkwood et al. 1996. *J.Clin. Oncol.* 14, 7-17), and HDI consisted of 20 MU/m²/d IV 5 days/week x 4 weeks. The IFN- α 2b dose was held and then restarted at a 33% dose reduction if severe toxicity (grade 3 or 4, defined by the common toxicity criteria established by the National Cancer Institute Cancer Treatment Evaluation Program;

Art Unit: 1632

Kirkwood, et al. 2001. *J.Clin.Oncol.* 19, 2370-2380) was observed. A second decrease of 33% of the original dosage was made in some patients for recurrent severe toxicity.

There is no enabling support either disclosed in the specification or in the art that “subsequently administering 10 MU/m²/day of interferon alpha to the host” as recited in amended claim 1 would result in any enhancement of a T cell response in the host cell.

To the best of Examiner's understanding of the disclosure in the specification and the relevant arts, balancing the effectiveness and toxicity of high dose interferon (HDI) is critical for the intended enhancement of T cell response, potential effect and toxicity resulting from deviations of established treatment regimen is unpredictable and requires undue experimentation. Accordingly, whether the dose regimen of interferon- α 2b starting at 10 MU/m²/d as recited in claim 1, which is 50% of disclosed dose (i.e. 20 MU/m²/d, 5 days/week x 4 weeks), will be effective in enhancing claimed T cell response is not predictable based on the disclosures in the specification and the status of art. This is supported by the disclosure of Sabel et al. stating that early trials using low-dose and intermediate-dose regimens demonstrated no benefits to survival (See, Sabel et al., abstract, *Drugs*, 63(11):1053-8, 2003). With regard to the unpredictability of interferon alpha recited in amended claim 1 step (b), **Stadler et al.** disclosed that interferons are a large family of proteins and glycoproteins, naturally occurring or artificially produced by recombinant biotechnology, and their antiviral, antiproliferative, antitumoral, and immunomodulatory activities are induced by alterations in cell metabolism after binding to specific membrane receptors. Stadler et al. disclosed that clinical trials have been performed worldwide with various regimens and have not always led to conclusive results, and in malignant melanoma a low response rate is obtained in metastatic disease with the use interferons such as

Art Unit: 1632

of interferon-alpha-2a, which belongs to interferon alpha family as recited in amended claim 1 (See abstract, and left column, page 653, Stadler et al., Interferons in dermatology, *J Am Acad Dermatol.* 20(4):650-6, 1989).

Applicant's arguments based on cited case laws that "a patentee need not test all the embodiments of his invention" so long as "he provide[s] a disclosure sufficient to enable one skilled in the art to carry out the invention commensurate with the scope of his claims have been fully considered and found not persuasive. As discussed in the preceding paragraphs in response to Applicant's arguments, the disclosure in the specification is only sufficient to enable treatment of melanoma in a host by administration to a host a polynucleotide encoding a melanoma-associated antigen, which comprises antigenic determinants that induce immune response, followed by multiple administration of interferon- α 2b at 20 MU/m²/day, 5 days/week for 4 weeks, wherein said administering of the polynucleotide and subsequent administration of interferon- α 2b result in an increased T cell response in the host relative to the T cell response that occurs following administering of the polynucleotide alone. Balancing the effectiveness and toxicity of high dose interferon (HDI) is critical for the intended enhancement of T cell response, potential effect and toxicity resulting from deviations of established treatment regimen is unpredictable and requires undue experimentation. It is worth noting that each claim of an application is considered under 35 U.S.C. 112, first paragraph in light of specification and the status of art, and the subject matter and the status of art of instant application are distinct from the recited case laws.

In summary, in view of the state of the art, the unpredictability in the art, and the lack of specific guidance and working examples in the specification, one of skill in the art would have to

Art Unit: 1632

perform undue experimentation to make and use the claimed invention commensurate in scope with the claims 1, 4-7, 11-15, and 17-28.

Conclusion

6. No claim is allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a).

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

Art Unit: 1632

Any inquiry concerning this communication from the examiner should be directed to Wu-Cheng Winston Shen whose telephone number is (571) 272-3157 and Fax number is 571-273-3157. The examiner can normally be reached on Monday through Friday from 8:00 AM to 4:30 PM. If attempts to reach the examiner by telephone are unsuccessful, the supervisory patent examiner, Peter Paras, can be reached on (571) 272-4517. The fax number for TC 1600 is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Wu-Cheng Winston Shen, Ph. D.

Patent Examiner

Art Unit 1632

/Thaian N. Ton/

Primary Examiner, Art Unit 1632